Routing User Guide

V*ISTA* Imaging
V. 3.0, Patch 22
September 2003

V*ISTA***A** Imaging Software Design & Development
Veterans Health Administration
Department of Veterans Affairs

Routing User Guide
Patch 22
September 2003

Property of the US Government

V*IST*A Imaging Software Design & Development
Department of Veterans Affairs
1335 East-West Highway 3rd Floor
Silver Spring, MD 20910
(301) 734-0100

Contents

Introduction

This manual explains how to configure and use the routing capability of the **V*IST*A** DICOM Gateway. This manual also explains how to use the on-demand routing capability of the VistARad diagnostic workstation software.

This manual is intended for:

- Staff at VA Medical Centers who are responsible for setting up and maintaining Routing Gateways.
- Clinical staff who need to use VistARad for on-demand routing.

For technical staff, this manual assumes familiarity with the **V*IST*A** System, MUMPS, and Windows networking. For clinical staff, this manual assumes familiarity with Windows NT and the VistARad diagnostic workstation software.

Terms of Use

In compliance with FDA and VA policies, authorization to use the software described in this document is contingent on the execution of a Site Agreement between the **V*IST*A** Imaging SD&D group and the site where this software is installed.

In addition to any restrictions noted in the Site Agreement, the following restrictions apply:

⚠ Caution: Federal law restricts this device to use by or on the order of either a licensed practitioner or persons lawfully engaged in the manufacture or distribution of the product.

⚠ No modifications may be made to this software without the express written consent of the **V*IST*A** Imaging National Project Manager.

⚠ The Food and Drug Administration classifies this software as a medical device. Modifications to the computer where this software is installed, such as the installation of unapproved hardware or software, will adulterate the medical device. The use of an adulterated medical device violates US Federal Law (21CFR820).

⚠ US Federal regulations and VA internal policy prohibit unencrypted transmission of patient information outside the VA's intranet.

About this Manual

Using this Manual

This document contains material of interest to different types of users.

User	Please read…
All users	The Routing Overview and the Glossary. The Index can also be used to find information about specific topics in this document.
Clinical users	The Using VistARad in a Routing System chapter.
Users responsible for DICOM Gateway operation and maintenance	The Using the Routing Gateway chapter. You may also find useful information in the Troubleshooting Routing and Defining Routing Rules chapters.
Users responsible for installing or configuring a routing system	The Defining Routing Rules and Configuring Routing chapters. Installation worksheets are available in Appendix A.

Conventions

This manual uses the following conventions:

- Examples are shown in `Courier`.
- VA File Manager file names are shown in SMALL CAPS. The first time a FileMan file is referenced in a topic, the file number is indicated in parentheses. Fields are shown in `Courier` and in uppercase.
- Menu options, buttons and other controls found in a graphical user interface are indicated by title case. Menu sequences are indicated by vertical bars (|). Example: Click File | Print, then click the Properties button to open the Properties dialog.
- Cross-references are underlined. If this document is being used online, cross-references are shown in blue and are active links.
- Sidebars shown in margins indicate new or revised content.

Acknowledgements

This document is based on the “Autorouting Tutorial” authored by Ed de Moel.

Special thanks to Brian Belleau, Craig W. Hunter, Cheryl Marland, Arnold Pfenninger, and Hedy Towan, who provided valuable background information and feedback for initial drafts of this document.

Revision Table

Date	Rev.	Notes
25 Jun 2002	.9	Draft. Based on 23 Sep 1999 "Autorouting Tutorial." Updated for Patch 9, test 2 distribution.
20 Mar 2003	1.0	Final version for p9 release.
22 Sep 2003	1.1	Minor p22 updates in VistARad chapter. Added info about routing rules and priority that was not included in original rev. Minor clarifications and corrections throughout.

Related Documents

The following documents contain additional information about routing:

- Routing Patch Description (Patch 9)
- Routing Guidance Document

The following documents contain additional information about components in the routing system:

- DICOM Gateway User Guide
- DICOM Gateway Installation Guide
- VistARad User Guide

The following documents contain information about the **V*IST*A** Imaging system in general:

- VistA Imaging System Installation Guide
- VistA Imaging System Technical Manual
- VistA Imaging System Planning Document & Approved Equipment List

Copies of these documents are available at http://vaww.va.gov.imaging.

This page is intentionally blank.

Routing Overview

This chapter provides an overview of how routing functions within the **V***IST***A** Imaging System. It covers the following topics:

Routing Explained

In **V***IST***A** Imaging, *routing* is the combination of methods and software used to identify and transmit exams produced at one site to a storage location at another site. Routing takes two forms: autorouting, and on-demand routing.

In *autorouting*, automatically selected images are transmitted to one or more destinations. Images are selected based on a predefined set of routing rules. Autorouting functions are managed using the Routing Gateway.

In *on-demand routing*, manually selected exams are transmitted to one or more destinations. Exams are selected using the VistARad diagnostic workstation and are transmitted by the Routing Gateway.

A properly implemented routing system can streamline a site's imaging workflow. Scenarios where routing can be used include:

- Workload sharing between institutions or service providers
- Rapid access of exams at remote clinics or other facilities
- Remote specialist interpretation or consultation
- Off-hours, holiday, or emergency services
- Off-site contract radiology services for primary interpretation

What is a Routing Gateway?

A Routing Gateway locates routable images, determines where the images are to be routed to, and sends copies of those images to other locations. Routing is a function of the DICOM Gateway software. When properly configured, any DICOM Gateway can function as a Routing Gateway.

Typically, a Routing Gateway runs on a dedicated computer. At sites where only a small volume of images are produced, a Routing Gateway can coexist on the same computer as an Image Gateway. (There is typically no benefit in combining Routing Gateway and Text Gateway functions onto the same computer).

Routing Prerequisites

For a site to be authorized to use a routing system:

- An executed Site Agreement must be filed with the **V*IST*A** Imaging SD&D group.
- A contingency plan must be implemented at all sites in the routing system and filed with the **V*IST*A** Imaging SD&D group. The contingency plan must contain procedures to be followed should the routing system be unavailable.

General hardware and operational requirements for routing are summarized below. For detailed information, contact your **V*IST*A** Imaging Implementation Manager.

Infrastructure Requirements

Routing relies on the following infrastructure:

- One or more VistARad diagnostic workstations for the display of routed exams.
- An operational **V*IST*A** Hospital Information System, an operational Image Gateway, and an operational Routing Gateway, configured as described in this document.
- An operational Local Area Network (LAN).
- An operational Wide Area Network (WAN) with sufficient bandwidth to manage the anticipated volume of routed exams.
- Windows NT-based servers to provide exam storage at each routing destination, configured as described in this document.

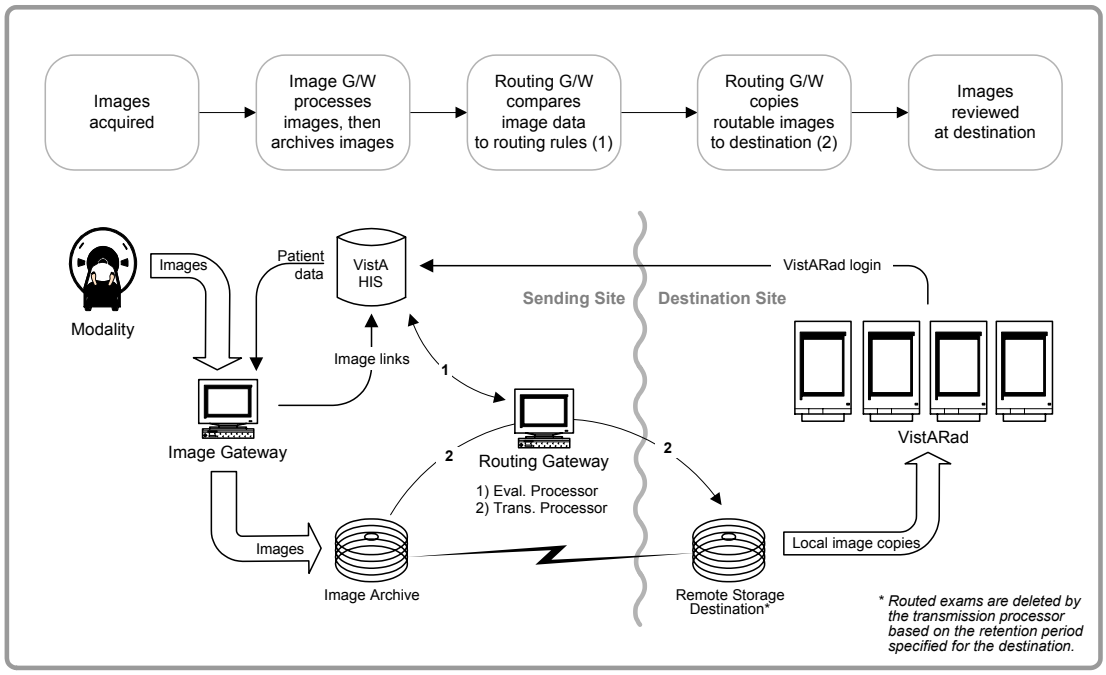
Operational Requirements

The medical and IT management at a site implementing the routing system will need to develop policies establishing:

- Locations to which the exams may and may not be routed
- Reporting / transcription requirements for routed exams
- Bandwidth utilization guidelines and priorities
- Storage of routed exams at receiving sites
- Management of patient confidentiality and privacy issues related to routed exams
- Methods for addressing performance issues and/or misuse of the routing system

How Autorouting Works

The following figure illustrates the transfer of autorouted images in a basic routing system. The processes outlined in this figure are explained in more detail below.



Identifying Images to be Autorouted

Autorouting begins with an Image Gateway. As it is processing DICOM images, a properly configured Image Gateway will add routing-specific entries to the rule evaluation queue.[1] This queue is continually checked by the Routing Gateway evaluation processor.

➲ If the Image Gateway is not configured to add entries to the rule evaluation queue, the images being processed by the gateway cannot be autorouted. For more information, see page 34.

The evaluation processor compares each image referenced in the rule evaluation queue against a set of site-specific routing rules. If the image should be routed, the evaluation processor creates an entry in the transmission queue.[2] After the entry in the rule evaluation queue is checked, the evaluation processor deletes the entry.

[1] The rule evaluation queue is a subset of the IMAGE BACKGROUND QUEUE file (#2006.03).
[2] The transmission queue is stored in the SEND QUEUE file (#2006.035).

Sending Images to Routing Destinations

The transmission of routed images is based on entries in the transmission queue. Each entry in the transmission queue identifies the image to be routed and the destination of the image.

The transmission queue is continually checked by the Routing Gateway transmission processor. For each entry in the queue, the transmission processor locates the image and the physical storage location for the destination,[1] and then copies the image.

After the image is copied, the appropriate entry in the transmission queue is updated with the status of the image transfer. Transmission queue entries are retained for tracking and troubleshooting purposes. Entries can be deleted as described on page 46.

Displaying Routed Images at a Receiving Site

A VistARad workstation is used to display routed exams. Radiologists performing remote reading with VistARad will log into the site that sent the routed exams, and then use the contents of the RC (Remote Cache) exam list column to determine which exams have been routed to them.

When a routed exam is displayed, the VistARad software will use a local configuration parameter to determine where to check for routed images. If the routed images are present locally, they are displayed with minimal delay. If images are not present locally, VistARad will retrieve the images from the sending (remote) site instead. For additional information about working with routed exams, refer to page 49.

Deletion of Routed Images

For each destination, the amount of time routed images are retained is based on the value of the RETENTION PERIOD field in the NETWORK LOCATION file (#2005.2). This value is set when the destination is defined.

Each day, when connecting to a destination for the first time, the transmission processor determines if images at the destination are older than the number of days specified in RETENTION PERIOD. Images older than the specified number of days[2] are deleted from the destination's storage location.

➲ Routed images are copies. The original image files are retained at the site where they were acquired.

---

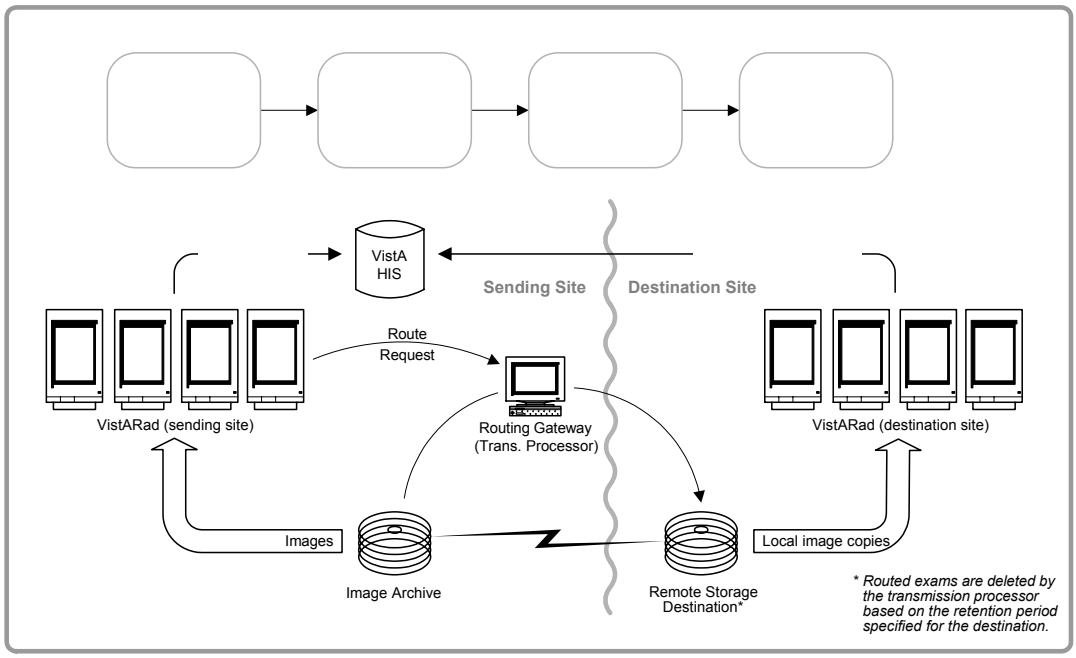
[1] The destination referenced in the transmission queue matches an entry defined in the sending site's NETWORK LOCATION file (#2005.2).

[2] The age of a routed image is based on the transmission queue entry for that image, not on the date of the image file itself. Changes made to the date of the image file (such as those made by some anti-virus packages) will not affect when the image is deleted.

How On-Demand Routing Works

On-demand routing relies on the same infrastructure as autorouting. However, in on-demand routing, exams to be routed are manually selected by a VistARad user, rather than being identified automatically by a Routing Gateway. With the proper security key, on-demand routing is available to any VistARad user in the routing system.

The following figure illustrates the transfer of images when on-demand routing is used.[1]



Selecting Images for On-Demand Routing

VistARad's Route Request dialog is used to select the exams to be routed on-demand and to indicate where exams are to be sent. When a user accepts the settings in the Route Request dialog, the exams are checked by VistARad to see if they can be routed (images are present, available in short-term storage, etc.). Then entries for each image in the selected exams are added to the transmission queue.

Once an exam has been added to the transmission queue, on-demand routing functions in the same way as autorouting.

[1] This figure illustrates on-demand routing being initiated from the site with a local Routing Gateway. On-demand routing can also be initiated from a destination site, as long as the destination site is logged into the location (division) where the exams to be routed were acquired.

How Routing Priority Works

The following factors are used to determine the priority of a routed exam:

- Assigned priority
- Clinical urgency (autorouting only)
- Time in transmission queue

Priority and Autorouting

For automatically routed exams, the routing software uses the clinical urgency and an assigned priority to calculate a numeric value.

Factor	Values	Notes
Assigned priority	Low: +250 Medium: +500 High: +750	Priority can be set using routing rules. Routing rules are described on page 7. If not explicitly set, a default value of Medium is used.
Clinical urgency	Routine: +0 Urgent: +10 STAT: +20	Values are based on the clinical urgency defined for the exam in the VistA system.

Entries with the highest priority value are transmitted first.

Priority and On-demand Routing

When an exam is routed on-demand, VistARad's Routing Request dialog can be used to assign a priority of Low, Medium or High. The clinical urgency of the exam is not used.

The Routing Request dialog is described on page 51.

Other Priority Factors

If two or more entries in the transmission queue have the same priority value, entries are processed on a First In, First Out (FIFO) basis.

Because the transmission processor works on an image-by-image basis, it is possible for the images in a lower-priority exam to be interrupted 'mid-stream' by the images in a higher-priority exam. If this happens, transmission of all lower priority images will resume after transmission of all higher-priority images is complete.

Defining Routing Rules

This chapter explains how to define the rules used for autorouting. This chapter covers the following topics:

➲ Routing rules can be defined before the configuration of the routing system is complete, but cannot be tested until the setup of the routing system is finished.

Routing Rules Explained

Autorouting relies on routing rules. Routing rules determine which images should be routed, and where the images are to be sent. Routing rules need to be established when the routing software is installed, and will need to be adjusted if there is a change of staff or workflow.

The definition of routing rules involves:

1. Determining the needs of the staff at the sending and receiving sites.
2. Determining what resources will be used at the receiving site.
3. Translating the resulting information into a rule that can be executed by the routing software.

   ➲ A worksheet that can be used for rules definition is located in Appendix A.

How Routing Rules Work

Routing rules are defined in a text file and are implemented when the text file has been imported into a local table on the Routing Gateway.

A basic routing rule looks like:

```
send("destination")
   when [condition A
         condition B...]
```

Each routing rule must contain at least one destination and one condition. When the conditions in a rule are met, the image is sent to the specified destination.

- The destination specified in a rule must match an entry in the NETWORK LOCATION file. Routing rule destinations are described in detail on page 10.
- A condition is a comparison between a general image property and the specific value associated with a particular image. Conditions are described in detail on page 12.

Sample Routing Rules

The following pages contain examples of routing rules as they would be entered into the `Route.DIC` file. For more information about the `Route.DIC` file, see page 34.

A Simple Routing Rule

A common routing scenario is the transmission of images from a particular modality for remote interpretation.

Send CR images to Kansas

```
send("KANSAS")
   when MODALITY = "CR"
```

Rules using Multiple Conditions

If a rule contains more than one condition, all of the conditions must be met for an image to be routed.

Send CR images produced in Wichita to Kansas

```
send("KANSAS")
   when MODALITY = "CR"
        SOURCE   = "WICHITA"
```

Tip: When defining multiple conditions for a rule, list the most restrictive condition first. Listing the most restrictive condition first will minimize the amount of time needed by the routing software to process the rule.

Note: The `SOURCE` condition currently functions only for sites running the VistA Imaging consolidated test software.

Rules using Wildcards

Wildcards can be used when you want a condition to be valid for more than one value. In the example below, all images, regardless of modality, will be routed.

Send all images to Kansas

```
send("KANSAS")
   when MODALITY="*"
```

Wildcards are described in detail on page 17.

Rules using the "does not match" Operator

A condition can use different types of operators. The previous examples used "=" as an operator, indicating that the specified image property must match a particular value for a condition to be met.

The following example uses "!=" as an operator, indicating the image property in question can be any value *except* the listed value.

Send non-CR images to Kansas

```
send("KANSAS")
   when MODALITY != "CR"
```

Operators are described in detail on page 16.

Rules using Date/Time-Based Conditions

A rule using date/time-based conditions can be used to route images based on date, time of day, or "type" of day (such as weekday, holiday, and so on).

A rule to send all CR images to a destination on certain days would look like:

Send CR images to Kansas on Mon/Wed/Fri

```
send("KANSAS")
   when MODALITY="CR"
        NOW={MON 00:01AM to 11:59PM;
             WED 00:01AM to 11:59PM;
             FRI 00:01AM to 11:59PM}
```

The NOW condition is described, along with other date/time-based conditions, on page 17.

Rule Destinations

The first parameter in a routing rule specifies where images meeting criteria in a rule are to be sent. A rule must contain at least one destination. The destination specified in the rule must match an entry in the sending site's NETWORK LOCATION file (#2005.2).

The SEND Command

Typically, the `send` command is used to specify a single destination, as in the example below:

```
send("KANSAS")
   when MODALITY="CR"
        NOW={MON 00:01AM to 11:59PM;
             WED 00:01AM to 11:59PM;
             FRI 00:01AM to 11:59PM}
```

To send similar exams to multiple destinations, multiple rules would be used, as shown below:

```
send("KANSAS")
   when MODALITY="CR"

send("BACKUP")
   when MODALITY="CR"
```

The BALANCE Command

Use the `balance` command when you want to divide a pool of exams between multiple destinations. When the `balance` command is used, you must specify what percentage of exams should be sent to each destination.

In the sample rule below, 25% of the exams are sent to `KANSAS`, and 35% of the exams are sent to `KANSAS2`. The remaining exams are not routed at all (as indicated by the `<local>=40%` portion of the command).

```
balance("KANSAS"=25%,"KANSAS2"=35%,<local>=40%)
   when MODALITY="CR"
```

➲ The total value of the percentages specified in the command must equal 100%.

How Load Balancing Works

When a rule incorporates the `balance` command, the routing software uses two things to determine which destination receives a given exam: the percentages specified in the rule and internal counters set by the routing software.

When a rule including a `balance` command is first applied, the routing software begins distributing exams the same way a deck cards are dealt: the first destination receives one exam, the second destination receives the next exam, and so on. Exams are evenly distributed until the destination with the lowest value specified in the `balance` command has received its allotted percentage of exams. Then that destination is skipped until the counter resets. Since load balancing is based on percentages, the counter is reset each time 100 exams have been sent.

For example, if a rule specifies…

```
balance("DEST1"=10%,"DEST2"=40%,"DEST3"=50%)
   when MODALITY="CR"
```

- The first 30 CR exams will be distributed evenly, with each destination receiving 10 exams. At this point, `DEST1` has received 10% of the exams, so the routing software will skip `DEST1` until the counter resets.
- The next 60 CR exams are split evenly between `DEST2` and `DEST3`. After this point, `DEST2` and `DEST3` each have each a total of 40 exams. `DEST2` now has its allotment of 40 exams.
- The remaining 10 CR exams are sent to `DEST3`, giving that destination a total of 50 exams.

Once 100 CR exams have been sent, the routing software resets all its counters to zero, and starts distributing exams to all three destinations again.

Note that a destination receiving a comparatively smaller percentage of exams will become idle more often than destinations that receive a greater percentage of exams.

Resetting the Load Balancing Counter

When routing rules are imported, the counters used for load balancing are all reset to zero. You can take advantage of this trait if you need to fine-tune or troubleshoot situations where load balancing is used. Note that it is not necessary to change routing rules to achieve this; you only need to re-import them.

Rule Conditions

In routing rules, a condition is a comparison between a particular property of an image and a user-supplied value. The results of the comparison determine if the rule will be applied to an image or not.

A routing rule can contain multiple conditions. A single `when` statement precedes all conditions in a rule.

```
send("KANSAS")
   when MODALITY = "CR"
        SOURCE   = "WICHITA"
```

The parts of a condition are:

```
property operator value
```

A property is one of the known attributes of an image. Properties that can be used in a condition are listed the following section.

An operator is a code for a type of comparison. Operators are described on page 16.

A value is a text or date string supplied by the user. A value specifies what is being tested in the condition. Values are described on page 17.

Properties

The properties listed in this section can be used in routing rule conditions. Properties are derived from the data dictionary for the IMAGE file (#2005).

➲ The name of a given property, when used in a condition, is not case-sensitive. However, for purposes of clarity, properties are typically rendered in upper-case.

Frequently-Used Properties

MODALITY

Abbreviation for the type of modality. Possible values are:

AS: Angioscopy
BI: Biomagnetic Imaging
CD: Color Flow Doppler
CF: Cinefluorography
CP: Colposcopy
CR: Computed Radiography
CS: Cystoscopy
LP: Laparoscopy
LS: Laser Surface Scan
MA: Magnetic Resonance Angiography
MG: Mammography
MR: Magnetic Resonance
MS: Magnetic Resonance Spectroscopy
NM: Nuclear Medicine

(*continued on next page*)

CT: Computed Tomography
DD: Duplex Doppler
DF: Digital Fluoroscopy
DG: Diaphanography
DM: Digital Microscopy
DS: Digital Subtraction Angiography
DX: Digital Radiography
EC: Echocardiography
ES: Endoscopy
FA: Fluorescein Angiography
FS: Fundoscopy
IO: Intra-oral Radiology
OT: Other
PT: Positron Emission Tomography (PET)
RF: Radio Fluoroscopy
RG: Radiographic Imaging (conventional)
ST: Single-Photon Emission Computed Tomography (SPECT)
TG: Thermography
US: Ultrasound
VF: Videofluorography
VL: Visible Light
XA: X-Ray Angiography

NOW

Date and time that the rule is being processed. For more information, see page 17.

SOURCE

Name from the IMAGING SITE PARAMETERS file (#2006.1) for the site that originally acquired the image.

➲ SOURCE currently functions only for sites running the VistA Imaging consolidated test software.

Other Properties

ABSTRACT_REF

The network storage location for the image abstract.

BIG_JUKEBOX_PATH

Full file path on jukebox for .BIG images. This field indicates whether this file is located on the jukebox.

BIG_MAGNETIC_PATH

Full file path for .BIG images. This field indicates on which magnetic server this file resides.

CLINIC

If an image is associated with a patient encounter (visit), the value of this parameter is the name of the clinic where the appointment occurred.

DESCRIPTIVE_CATEGORY

This is mainly for Document Imaging, it further describes the type of document image.

EXAM_TIME

The date/time of the procedure or the examination. For more information, see page 17.

EXAM_TIME can be used to compare the exam date/time of the "image at hand" to the provided value.

EXAM_TIME_FIRST can be used to compare the exam date/time of the earliest (oldest) image in the exam to the provided value.

EXAM_TIME_LAST can be used to compare the exam date/time of the latest (newest) image in the exam to the provided value.

EXPORT_REQUEST_STATUS

The value of this field, if defined, indicates if MailMan will send or has sent the image to another site. Possible values are:

```
1 = EXPORT REQUESTED
0 = EXPORTED
```

FILE_REF

The unique image filename of the image, as stored on the magnetic server (and/or jukebox).

IMAGE_SAVED

The date and time the image was captured (as opposed to the date and time of the procedure or exam). For more information, see page 17.

IMAGE_SAVED can be used to compare the save date/time of the "image at hand" to the provided value.

IMAGE_SAVED_FIRST can be used to compare the save date/time of the earliest (oldest) image in the exam to the provided value.

IMAGE_SAVED_LAST can be used to compare the save date/time of the latest (newest) image in the exam to the provided value.

LAST_ACCESS

The date and time the image was last viewed or accessed. For more information, see page 17.

LAST_ACCESS can be used to compare the last access date of the "image at hand" to the provided value.

LAST_ACCESS_FIRST can be used to compare the last access date of the earliest (oldest) image in the exam to the provided value.

LAST_ACCESS_LAST can be used to compare the last access date of the latest (newest) image in the exam to the provided value.

MAGNETIC_REF
The path for the network location of the stored image.

MICROSCOPIC_OBJECTIVE
Free text description of the Microscopic Objective selected by the pathologist. It identifies the power of the microscope objective used when capturing the image of the slide.

OBJECT_NAME
The natural language name for the image, usually consisting of the patient name, social security number, and image description.

OBJECT_TYPE
The object type (such as still image, black & white image, x-ray) as described in the OBJECT TYPE file (#2005.02).

PACS_PROCEDURE
The name in the radiology reports file that identifies the procedure.

PACS_UID
The unique 26-character image identifier of the PACS image.

PARENT_DATA
The name of the file that contains the "Parent Data." See also PARENT_DATA_FILE_IMAGE_POINTER, PARENT_GLOBAL_ROOT_D0 and PARENT_GLOBAL_ROOT_D1.

PARENT_DATA_FILE_IMAGE_POINTER
In the file identified by "Parent Data," a multiple valued field may exist that identifies groups of images. When there is such a "multiple," the value of this parameter is the entry number in this multiple that points back to the parent image of the current image.

PARENT_GLOBAL_ROOT_D0
The internal entry number in the file identified by PARENT_DATA.

PARENT_GLOBAL_ROOT_D1
The value of this parameter is defined only for laboratory images to record the third subscript of ^LR(D0,"SP",D1) as a backward pointer for use in report display and image deletion.

PATH_ACCESSION_NUMBER
The Anatomic Pathology accession number - the identifying number for the slide.

PATIENT
The name of the patient.

PROCEDURE
An abbreviation for the procedure, such as COL for colonoscopy, SUR for surgery, SP for surgical pathology, or XRAY for radiology.

PROCEDURE_TIME
The date/time of the procedure or the examination. For more information, see page 17.

PROCEDURE_TIME can be used to compare the procedure date/time of the "image at hand" to the provided value.

PROCEDURE_TIME_FIRST can be used to compare the procedure date/time of the earliest (oldest) image in the exam to the provided value.

PROCEDURE_TIME_LAST can be used to compare the procedure date/time of the latest (newest) image in the exam to the provided value.

RADIOLOGY_REPORT
The name of the Radiology Report associated with the image.

SAVED_BY
The name of the person who logged in to capture the image.

SHORT_DESCRIPTION
A one-line description of the image or object record.

SPECIMEN
The specimen number of the slide given in the LAB DATA file (63).

SPECIMEN_DESCRIPTION
The description given to the specimen in the LAB DATA file (63).

STAIN
Free text description of the Histological Stain.

WORM_REF
The network location of the jukebox platter where the image is stored (provided there is a jukebox in the Imaging System).

Operators

The following operators can be used in routing rule conditions:

Operator	Image property must…
=	Match value in rule.
!=	Not match value in rule.
<	Be less than a numeric value in rule. For date/time-based values, this operator can be used for "earlier than."
>	Be greater than a numeric value in rule. For date/time-based values, this operator can be used for "later than."
<=	Be less than or equal to a numeric or date/time value in rule.
>=	Be greater than or equal to a numeric or date/time value in rule.

Values

Values are the user-supplied part of a routing rule condition. Most values are text strings.

Values are typically enclosed in quotation marks ("). If a value contains both upper- and lower-case characters, or if it contains punctuation marks or spaces, quotation marks are required.

Two types of wildcard characters can be used in routing rules: the asterisk (*) and the question mark (?). The question mark allows one single character in a value to be "any character." The asterisk allows one or more characters to be " any character."

The following examples demonstrate how wildcards can be used in text-based values:

`PATIENT="*CRAY*"`
To meet this condition, the patient name for an image must contain the characters `CRAY`. Any characters may precede or trail these characters. Names like `CRAY`, `MCCRAY`, and `CRAYNE` will meet this condition, but `CREY` will not.

`PATIENT="SMIT?"`
To meet this condition, the patient name for an image must start with the characters `SMIT`, after which exactly one character may follow. Names like `SMITH` and `SMITT` will meet this condition, but `SMITHSON` will not.

`PATIENT="PETERS?N"`
To meet this condition, the patient name for an image must start with the characters `PETERS`, then contain one arbitrary character, then end with `N`. Names like `PETERSON` and `PETERSEN` will match this comparison, but `PETERSSEN` will not.

Values for Date/Time-Based Properties

When condition based on date and time is used, the supplied value must adhere to VA-FileMan conventions. Values for date/time-based conditions are presented as a range enclosed in braces { }.

The most frequently used date/time property is `NOW`. `NOW` can be used to select the times that a staff member will be present by specifying certain workdays and times of day.

Send CR images to Kansas on Mon/Wed/Fri

```
send("KANSAS")
   when MODALITY="CR"
        NOW={MON 08:00AM to 17:00PM;
             WED 08:00AM to 15:30PM;
             FRI 08:00AM to 17:00PM}
```

Date/time properties can also be used to specify holidays. In this context, holidays are those days that are marked as such in the sending site's HOLIDAY file (40.5). A rule to send images on holidays only could be specified as:

Send CR images to Kansas on Holidays

```
send("KANSAS")
   when MODALITY="CR"
        NOW={HOL 00:01AM to 23:59PM}
```

Date/time ranges use a 24-hour clock. While the use of AM or PM indicators is not required they can be useful when the hours specified are 0:00 AM (midnight) and 12:00 PM (noon). Date/time ranges can be used to express date values from any century as well as time values for any second in the day.

When the routing software compares a date/time property in an image entry to a specified value, the date/time value is broken into components:

- Day of week
- Day of month
- Month
- Year
- Hour
- Minute
- Second

Which of these components will be used in the actual comparison will depend on the specified value.

Routing Rule Priority

Automatically routed exams are assigned a default priority of 'Medium.' This priority can be changed by adding a Priority statement to the end of the rule.

Prioritize images based on destination

```
send("KANSAS")
   when MODALITY="CT"
   Priority High

send("BACKUP)
    When MODALITY="CT"
    Priority Low
```

In addition to the priority that is derived from routing rules, the routing software takes the clinical urgency of an exam into account. For more information, see page 6.

Routing Rule Tips

The following tips may be useful while creating or editing routing rules:

- When defining multiple conditions for a rule, list the most restrictive condition first. This will reduce the amount of time needed to process the rule.
- The number symbol # can be used for comments, or to disable a rule. When disabling a rule, precede each line in the rule with #.
- Spaces and line breaks can be used as needed for legibility.
- `Route.dic` must end with a line-feed. To ensure proper termination of the last meaningful line, add a comment-line after the last routing rule, such as:

```
# last update on 1 April 2003
# end of file
```

When rules are imported as described on page 34, the routing software will check the syntax used and will report on any problems detected.

This page is intentionally blank.

Configuring Routing

This chapter assumes that routing software has been installed, and that an initial set of routing rules have been defined.

This chapter explains how to configure a routing system. The following table lists the configuration tasks described in this chapter.

Configuration Task	Performed By	See Page…
Establish naming conventions for sending and receiving sites	All sites involved	22
Create destination folder / remote storage location	Receiving site	24
Verify destination accessibility	Sending site	25
Define destinations in NETWORK LOCATION file (#2005.2)	Sending site	27
Image Gateway configuration	Sending site	32
Routing Gateway configuration	Sending site	33
Import routing rules	Sending site	34
VistARad site parameter setup	Sending site	36
VistARad workstation setup	Receiving site	37
Alter configuration in response to changes in routing system	All sites involved	39

A configuration checklist is also available in Appendix A.

Destination Naming Conventions

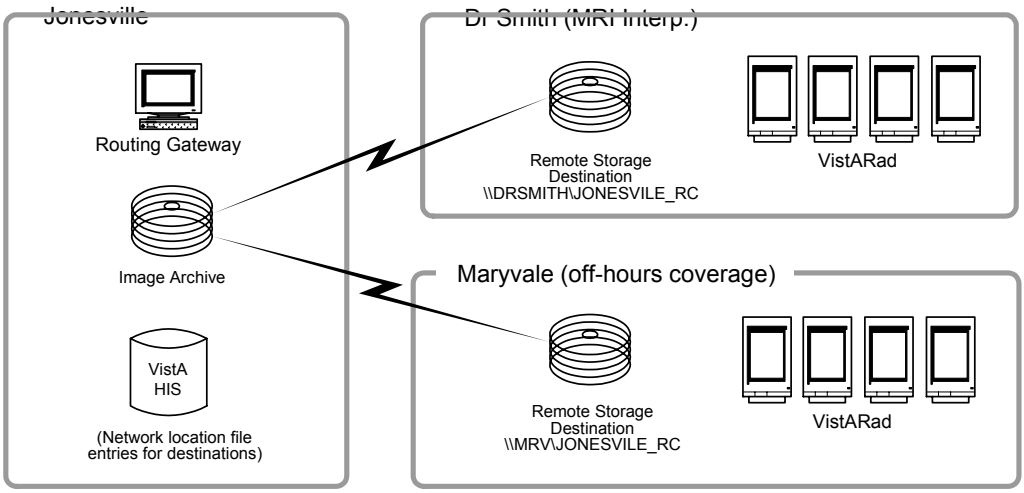
Before a routing destination is established, the sending and receiving sites should decide how to identify themselves to routing users.

The key values used to identify a destination are stored in the NETWORK LOCATION file (#2005.2) at the site where the Routing Gateway is installed.

Field	Describes…	Notes
Network Location (.01)	The "official" destination name.	Used by routing rules and the Routing Gateway at the sending site. Referenced in VistARad CacheLocationID at appropriate receiving site. Must be unique within Network Location file. Limited to 30 characters, no spaces or punctuation. The value used should contain the nationally assigned 3-character site code and should indicate that the entry in question is used for routing.
Physical Reference (1)	The computer and share name at the receiving site.	Should be meaningful to both the sending and receiving sites. Cannot exceed 63 characters in length
Site (25)	Destination as reported to VistARad users.	Used in the RC column of VistARad's exam lists. The value used should contain the nationally assigned 3-character site code.

When a destination is established, all of its values should be related in some way. The example on the following page illustrates destination names for a fictional routing system.

In this system, the sending site uses autorouting to meet two sets of needs. MRI images are routed to a off-site specialist for interpretation. Urgent exams acquired in the evening are routed to an affiliated hospital for after-hours interpretation.



NETWORK LOCATION file Entries at "Jonesville"

Name field for Destination 1:	DRSMITH_MRI_RC
Phys. Ref. field for Destination 1:	\\DRSMITH\JONESVILLE_RC
Site field for Destination 1:	DRSMITH
Name field for Destination 2:	MARYVALE_RC
Phys. Ref. field for Destination 1:	\\MRV_RC1\JONESVILLE_RC
Site field for Destination 2:	MRV

Storage Location Names at Dr Smith's Office

Folder name:	Exams_from_Jonesville
Computer and share name:	\\DRSMITH\JONESVILLE_RC
VistARad CacheLocationID:	DRSMITH_MRI_RC

Storage Location Names at Maryvale

Folder name:	Exams_from_Jonesville
Computer and share name:	\\MRV_RC1\JONESVILLE_RC
VistARad CacheLocationID:	MARYVALE_RC

Creating Destination Folders for Receiving Sites

Creating a destination folder is one of the two steps that need to be completed to create a routing destination.

- This section explains how to create and verify a destination folder on a Windows-based server. The destination folder will be used as the storage location for routed images at a receiving site.
- For information about defining the NETWORK LOCATION file entry that will reference a destination folder, refer to the next section.

Destination Folder Prerequisites

Before creating a destination folder for routed images:

- A username and password, to be used by the routing software to copy images to the destination folder, will need to be established by the receiving site. The username/password must be provided to the sending site.

  Note: Unannounced password changes are a major cause of routing problems. To avoid future problems, the sending and receiving sites need to establish a procedure by which username/password changes can be implemented without adversely affecting routing.

- The sending site and the receiving site must establish naming conventions to use for the various elements that describe a destination. For more information, refer to the previous section.
- The sending site should work with the receiving site to estimate the amount of storage space needed for routed images, based on the anticipated volume of transmitted images and the planned retention period.

Destination Folder Creation

When a destination folder is established by the receiving site, the receiving site will need to choose a logical folder name and share name. The share name will ultimately be referenced in the *sending* site's NETWORK LOCATION file.

The following steps explain how to create a destination folder using Windows Explorer.

Creating & sharing a routing destination folder

1. Log in as an Administrator to the computer where you will be creating the destination folder, and start Windows Explorer (choose Start | Run, then type Explorer).
2. Select the drive (or folder) that you want to create the new destination folder in.

3 Click File | New | Folder. After the new folder appears in the right side of the Explorer window, type the name of the new folder and press Enter.

4 Right-click the new folder, then click Sharing.

5 In the Sharing tab, click the Shared As option, then enter the share name you want used for the folder. (In Windows 2000, use 'Share this folder')

- The share name cannot contain punctuation marks or spaces, and the combined string identifying the computer and the shared folder cannot be more than 63 characters long.
- The share name you enter must match the `PHYSICAL REFERENCE` field value (#2005.2,1) defined at the site that will be sending images to this folder.
- It is recommended that you make the folder a "hidden share" by adding a dollar sign ($) to the end of the share name. A hidden share will be accessible by the routing software, but will not be visible to users browsing your network.

6 After typing the share name, click Permissions.

7 In the Permissions dialog, click Add, then select the user group / user name that the routing software will use to access this folder.

- The username and password for the user you choose will need to be included in the NETWORK LOCATION file entry that references this folder.
- Use the domain name as well as the username. Example: `VHAIS\VHAKANIU` (note the absence of leading backslashes).

8 After adding the "routing user," set the access type for the routing user to Full.

9 In the list of users allowed to access the folder, click the "Everyone" user group, then click Remove.

10 When you are finished, click OK to apply your changes and to close the Properties dialog.

Destination Folder Verification

After the receiving site has created a folder for routed images, the sending site will need to verify that the folder can be remotely accessed and that files can be copied to and deleted from the folder.

➲ To complete the following steps, you will need the username and password that the routing software uses to access the destination folder.

Testing destination folders from the sending site (Explorer)

1 On the computer you will be using to test the destination folder, log in as an Administrator.

2 Start Windows Explorer (choose Start | Run, then type Explorer), then click Tools | Map Network drive.

3 In the Map Network Drive dialog, enter the drive letter, path, and username (including domain name) that the routing software will be using. Then click OK.

4 When prompted, enter the password that will be used by the routing software, then click OK.

➲ If you cannot map the destination folder, use the next set of steps to provide more detailed information about the problem you are encountering.

5 Select the folder you just mapped to, copy a test file into the folder, and then delete the file. If the file is successfully copied and deleted, the routing software should be able to use the folder.

6 Disconnect the mapped drive.

Testing destination folders from the sending site (Command Line)

1 Log in as an Administrator to the computer you will be using to test the destination folder on.

2 Open a command prompt window (choose Start | Run, then enter CMD).

3 Enter the following command to map the destination folder to a local drive. Parameters shown in bold will need to be replaced with valid values established by the receiving site

```
> net use x: \\VHAxxxxxx\sharename\ password /u:username
```

4 After mapping the drive, copy a test file to the destination folder, and then delete the file. If the file is successfully copied and deleted, the routing software should be able to use the folder.

```
> copy any.file x:\<path>
> delete x:\<path>\any.file
```

5 When you are satisfied that the above parameters can be used to successfully access the destination folder, delete the test file, then terminate the test connection.

```
> net use x: /delete
```

➲ Be sure to terminate the test connection. Letting a connection linger may prevent the routing software from establishing its own connection to the folder.

Defining Destinations in the NETWORK LOCATION File

This section explains how to define a routing destination by creating a routing-specific entry in the NETWORK LOCATION file (#2005.2) and provides a routing-oriented description of each of the fields in this file.

Defining Destinations using FileMan

The sending site will need to define an entry in the NETWORK LOCATION file for each routing destination. The entry will need to reference a destination folder defined as described on page 24.

For information about values for specific fields, refer to the next section. A destination definition worksheet is also located on page 59.

The following steps explain how to create such an entry using FileMan. Currently, FileMan must be used because the Background Processor's Network Location Manager does not support all of the options used to define a routing destination.

Editing the Network Location file at the sending site

1 Log into the **V*IST*A** Hospital Information System.

2 Use FileMan to select the NETWORK LOCATION file (#2005.2) for editing.

```
Select OPTION: E ENTER OR EDIT FILE ENTRIES

INPUT TO WHAT FILE: 2005.2 NETWORK LOCATION (7 entries)
EDIT WHICH FIELD: ALL// <Enter>
```

3 When you are prompted to select a network location, enter the name that you want used for the destination.

```
Select NETWORK LOCATION: TESTDEST
  Are you adding 'TESTDEST' as a new NETWORK LOCATION (the 11TH)? No// YES
```

➲ This field value must be entered in upper case, and cannot contain punctuation or spaces.

4 At the next prompt, enter the computer name and share name of the storage location you want used for this destination.

```
PHYSICAL REFERENCE: \\VHAxxxxxx\images$\
```

5 At each new prompt, enter the desired values for each field. Be sure to enter `Y` at the `ROUTER` prompt.

➲ Typical values for a routing destination are shown below. For more detailed information about a particular field, enter "?" at the prompt, or refer to the next section.

```
…
STORAGE TYPE: MAG   MAGNETIC
TOTAL SPACE: <blank>
SPACE USED: <blank>
FREE SPACE: <blank>
OPERATIONAL STATUS: 1  On-Line
HASH SUBDIRECTORY: <set as appropriate for your site>
ABSTRACT: N   No
FULL: Y   Yes
BIG: Y   Yes
TEXT: Y   Yes
DICOM: N   No
COMPRESSION: <blank>
USER NAME: <Use the "routing username" here>
PASSWORD: <Use the "routing password" here>
MAINTAINCONNECTION: <blank>
MAX # RETRY ON CONNECT: 3
MAX # RETRY ON TRANSMIT: 5
SYNTAX: U UNC
SUBDIRECTORY: <blank>
Select USER   <blank>
RETENTION PERIOD: 5
LAST PURGE DATE:
SITE: <set as appropritate for your site>
ROUTER: Y  YES
TIME OFFLINE: <blank>
MUSE SITE #:  <blank>
MUSE VERSION #: <blank>
```

Field Definitions

Fields used in the NETWORK LOCATION file (#2005.2) are described below. These fields are listed in the order that they are defined in the file, and their descriptions assume that a routing destination is being defined.

NETWORK LOCATION

The value of this field will serve as the destination name for the location where image files will be sent. The routing software will not accept values that include lower-case characters or punctuation marks.

- The value for this field is used in the routing rules file (described on page 34).
- The value for this field can be different from the actual directory name or "share" name used for physical network location being referenced.
- For consolidated sites only, the value of this field can contain dashes (–).

PHYSICAL REFERENCE

The value of this field identifies the physical network location where routed images will be stored. This value must contain the computer name and the share name of the directory where routed images will be stored.

```
\\ISWIMG01\IMAGE1$\
\\TeleRad\Wichita$\
```

This value must be entered using UNC (Universal Naming Convention) standards. This field is limited to 63 characters in length, must end in a backslash (\ ), and the part of the name that identifies the computer cannot contain punctuation.

TOTAL SPACE
SPACE USED
FREE SPACE

These fields are not used for routing. The Background Processor uses these fields and will set values as needed.

OPERATIONAL STATUS

The value for this field can be `0` (off-line) or `1` (on-line). The routing software will set this value appropriately as it is operating. When no connection can be established, the routing software will set this field to `0` (off-line). Once this field is set to `0`, the routing software will not attempt to reach the storage location referenced in this entry for 15 minutes. After 15 minutes have passed, the routing software will reset this field to `1` and then try to connect again.

STORAGE TYPE

The value of this field describes the media type for the storage location identified above. For routing destinations, the value will be `MAGNETIC`.

HASH SUBDIRECTORY

The value of this field determines if routed image files are stored in one single directory (value is `No` or empty), or in a hierarchy of directories (value is `Yes`). This value should be set based on the needs of your site.

ABSTRACT

The value of this field indicates whether or not "abstract" files should be transmitted to this destination. Abstract files (also known as thumbnail or icon files) are used by Clinical Display workstations.

FULL

The value of this field indicates whether or not "full" files should be transmitted to this destination. Full files contain the complete image, potentially at a reduced resolution. For routing, this field should be set to `Yes`.

BIG

The value of this field indicates whether or not "big" files should be transmitted to this destination. Big files contain the complete image, always at the original resolution. For routing, this field should be set to `Yes`.

TEXT

The value of this field indicates whether or not text files should be transmitted to this destination. Text files contain the header information from the original DICOM file. For routing, this field should be set to `Yes`.

DICOM

<Future use>The value of this field indicates whether or not native-format DICOM files should be transmitted to this destination.

COMPRESSION

<Future use> The value of this field is a code that indicates which type of compression will be used for transmission to the remote location. Currently, the only type of compression that is supported is `None`.

USER NAME

The value of this field is the username that the routing software will use to log into the shared folder defined in the `PHYSICAL REFERENCE` field. This username must include permission to read, write, and delete on the physical storage space for this destination.

PASSWORD

The value of this field is the password that is used with the username above to log into the destination. The password is case-sensitive and is stored in an encrypted format.

MAINTAINCONNECTION

This field is not used for routing, and should be left blank.

MAX # RETRY ON CONNECT

Indicates the maximum number of successive attempts that will be made by the routing software to connect to this destination. A typical value is three attempts.

If a successful connection cannot be made, the destination will be marked "off-line." After 15 minutes, the destination will be marked "on-line," and the routing software will begin trying to connect to this destination again.

MAX # RETRY ON TRANSMIT

Indicates the maximum number of successive attempts the routing software will make to transmit a file to this destination. A typical value is five attempts.

When it is not possible to make a successful copy of an image within the number of attempts, the entry for the image in the transmission queue will be marked as failed (There is a Routing Gateway menu option to re-transmit failed queue entries.)

SYNTAX
The value of this field is a code that indicates the format for the name of the physical location. Currently, only UNC (Universal Naming Convention) is accepted.

SUBDIRECTORY
Typically, this field is left blank. The value of this field determines if a subdirectory (under the directory specified in PHYSICAL REFERENCE) should be used to store files for this destination. If hashing is turned off, all transmitted files will be stored in the subdirectory specified in this field; if hashing is turned on, all transmitted files will be stored in subdirectories of this subdirectory.

Select USER
<Future use> The values that may be entered for this (multiple-valued) field are e-mail addresses that will be used by a future version of the routing software to notify people about significant events related to routing activities.

RETENTION PERIOD
The value of this field determines the number of days routed image files are stored at this destination. A typical value is five days.

Whenever a transmission processor connects to a destination, it checks whether or not it has executed a purge for that destination on that day. If the connection in question is the first of the day and no purge has been executed yet, a purge will be initiated. During a purge, any image files older than the number of days specified by RETENTION PERIOD are deleted (note that files are always retained at the sending site).

LAST PURGE DATE
The value of this field is set by the transmission processor when it executes a purge.

SITE
The value of this field is a code used by VistARad to identify the source of routed exams. The value of this field can be any text string. In the VistARad software, the value for this field will be shown in the RC (Remote Cache) exam list column.

ROUTER
The value of this field indicates whether or not the shared folder defined in the PHYSICAL REFERENCE field is being used as a routing destination. For routing, the value of this field must be Yes.

TIME OFFLINE
The value of this field will be filled in by the transmission processor if it marks a destination as off-line. For more information, see MAX # RETRY ON CONNECT.

MUSE SITE #
This field is not used for routing. For MUSE EKG network locations, this field contains the MUSE site number assigned by a GE Marquette field engineer during MUSE server installation.

MUSE VERSION #

This field is not used for routing. For MUSE EKG network locations, this field contains the MUSE software version number.

DICOM Gateway Configuration

A site that is the source of autorouted images will need to set the configuration file for **all** Image and Routing Gateways as described in the following sections.

➲ No configuration changes are needed for Text Gateways in a routing system.

Image Gateway Configuration

Image Gateways at a site using autorouting will need to have their configuration file set as described below.

➲ The following steps cover only routing-related configuration parameters. For information about other configuration parameters, refer to the DICOM Gateway Installation Guide.

To configure Image Gateways

1. Open a telnet window and log into the DICOM Gateway software.
2. Enter `4` to select "System Maintenance" from the DICOM Gateway Menu [MAGDMENU].
3. Enter `2` to select "Gateway Configuration and DICOM Master Files."
4. Enter `1` to select "Update Gateway Configuration files."
5. Set the prompts indicated in bold below to Yes.

```
…
Will this computer be a DICOM Image Gateway? YES// YES

Will this computer be a DICOM Text Gateway? NO// NO

Will this computer be a Routing Gateway? NO// NO

➲ Will this computer be part of a system where autorouting is active? NO// Yes

Send text to a commercial PACS, Mitra Broker, et cetera? NO// NO
…
```

6. Press `<Enter>` to cycle though the rest of the prompts and to exit the program.

Routing Gateway Configuration

The workstation serving as a Routing Gateway will need to have its configuration file set as described below. Completing these steps will make the Routing Gateway menu option and its submenus available in the main DICOM Gateway Menu [MAGDMENU].

➲ The following steps cover only routing-related configuration parameters. For information about other configuration parameters, refer to the DICOM Gateway Installation Guide.

To configure the Routing Gateway

1. Open a telnet window and log into the DICOM Gateway software.
2. Enter `4` to select "System Maintenance" from the DICOM Gateway Menu [MAGDMENU].
3. Enter `2` to select "Gateway Configuration and DICOM Master Files."
4. Enter `1` to select "Update Gateway Configuration files."
5. Set the prompts indicated in bold below to Yes.

```
…
Will this computer be a DICOM Image Gateway? YES// NO

Will this computer be a DICOM Text Gateway? NO// NO

➲ Will this computer be a Routing Gateway? NO// Yes

➲ Will this computer be part of a system where autorouting is active? NO// Yes

Send text to a commercial PACS, Mitra Broker, et cetera? NO// NO
…
```

6. Press `<Enter>` to cycle though the rest of the prompts and to exit the program.

Importing Routing Rules (Route.DIC)

This section covers the following topics:

This section assumes that you have prepared your routing rules as described in the previous chapter.

Creating and Importing a Routing Rules File

Routing rules are initially defined in the `\DICOM\Dict\Route.DIC` file, which is stored on the Routing Gateway. This file can be created and modified using any text editing program.

Routing rules take affect after `Route.DIC` has been imported into a local MUMPS table used by the Routing Gateway.

To create and import routing rules

1. On the Routing Gateway, use a text editor to open **`x:`**`\DICOM\Dict\Route.DIC`, where **`x`** is the name of the drive used by the Routing Gateway to store dictionary files.

   ➲ The first time routing rules are defined, this file will need to be created. If you are modifying an existing file, it is recommended that you create a backup copy of the file.

2. Enter your rules.

   ➲ `Route.dic` must end with a line-feed. To ensure proper termination of the last meaningful line, add a comment-line after the last routing rule, such as:

   ```
   # last update on 1 April 2003
   # end of file
   ```

3. Save the file into the directory noted in Step 1.

   - When using programs such as Microsoft Word, make sure that the file is saved in "text only" mode.
   - Confirm that the file extension is not changed by the text editor. The file will only be imported if it is named `Route.DIC` and if it is stored in the proper directory.

4. Open a telnet window and log into the Routing Gateway software.

5. Enter `3` to select "Routing Gateway" from the DICOM Gateway Menu [MAGDMENU].

6 Enter `5` to select "Import Routing Rules."

7 When you are prompted to build the Routing Table, enter `Y`.

```
Ready to build the Routing Table?  y// y <Enter>
```

8 The file will be imported. If the import is successful, the following will be displayed. You will be prompted to Enter to end the process.

```
EOF
Press <Enter> to continue:
```

➲ If you encounter any errors, record the information and then press Enter. You will need to correct the offending rules and repeat these steps.

Re-Importing Routing Rules

If routing rules need to be changed, `Route.DIC` will need to be modified, and then re-imported. When routing rules are re-imported:

- The existing routing table will be replaced. Retaining the original set of rules in a backup file allows you to restore the routing table, if necessary.
- If you are using load balancing, importing routing rules will cause internal counters that control load balancing to be reset. For more information, see page 11.
- If multiple Routing Gateways are present, the steps for importing modified rules file must be performed for **all** Routing Gateways, even if the Gateways are all using the same set of rules.

Routing Rules & Multiple Routing Gateways

If multiple Routing Gateways are each running an evaluation processor (as could be the case at a consolidated site) it is possible for each Routing Gateway to use its own local set of rules.

However, it is usually better for all Routing Gateways to use a single set of rules stored in a shared directory. Using the same set of rules will make maintenance easier (changes to rules need to be made in only one `Route.DIC` file, rather than several), and allows each gateway in the pool to function as a back-up for any other gateway.

VistARad Configuration—Sending Sites

For sites that will be *sending* autorouted images:

- The MAG VISTARAD SITE PARAMETERS file (#2006.69) needs to be edited.
- A site's SITE CODE (IMAGING SITE PARAMETERS file (#2006.1)) must be set to a non-null value that will identify the sending site.

To set routing-related VistARad site parameters

1. Open a telnet window and log into the **V*IST*A** Hospital Information System.
2. Access the VistARad System Options menu [MAGJ MAIN] and run the "E/E VistARad Site Parameters" option [MAGJ VISTARAD SITE PARAMETERS].
3. Set the routing-related fields (shown in bold below) to YES.

```
Select MAG VISTARAD SITE PARAMETERS VISTARAD SITE NAME: DEMO
VISTARAD SITE NAME: DEMO//
ENABLE STATUS UPDATE?: YES//
RECENT EXAMS DAYS LIMIT: 9999//
UNREAD EXAMS DAYS LIMIT: 9999//
PREFETCH ACTIVE?: YES//
LIST ONLY EXAMS HAVING IMAGES?: NO//
ENABLE SERIES DISPLAY?: YES//
BACKGROUND COMPILE EXAM LISTS?: NO//
UNREAD BKGND COMPILE INTERVAL: 2//
RECENT BKGND COMPILE INTERVAL: 30//
REMOTE LIST ONLY REMOTE CACHE?: NO// YES  <recommended>*
SITE SENDS TO REMOTE CACHE:  NO// YES     <required>†
PATIENT LIST LIMIT # YEARS: 10//
PATIENT LIST LIMIT # EXAMS: 15//
UNREAD LIST PRIORITY SEQ: S,U,P,R//
```

➲ These steps assume that other fields in MAG VISTARAD SITE PARAMETERS are already set as desired. For information about other site parameters, refer to chapter 3 in the **V*IST*A** Imaging Installation Guide.

4. Use FileMan to check the value of your site's SITE CODE field (#2006.1,.09) The value entered must not match any of the CacheLocationID values defined at

---

* REMOTE LIST ONLY REMOTE CACHE? Determines how the UnRead and Recent exam lists are presented to remote VistARad users. When this field is set to YES, the UnRead and Recent exam lists presented to remote VistARad users will show only the exams that have been routed to their site. When this field is set to NO, all exams will be included in the exam lists.

† SITE SENDS TO REMOTE CACHE? Setting this field to YES turns on extra processing that is needed to manage routed exams properly. One of the results of setting this field to YES is the addition of the RC column to VistARad's exam lists. The RC column is described on page 49.

receiving sites (see the next section for details). It is recommended that the SITE CODE be set to your standard 3-digit site code.

```
Select OPTION: E ENTER OR EDIT FILE ENTRIES

INPUT TO WHAT FILE: 2006.1 IMAGING SITE PARAMETERS (1 entry)
EDIT WHICH FIELD: ALL// .09 SITE CODE
THEN EDIT FIELD: <enter>

Select IMAGING SITE PARAMETERS NAME: `1 TEST SITE
SITE CODE: TST
```

VistARad Configuration—Receiving Sites

VistARad workstations at receiving sites will need to be configured to check the appropriate local storage location for the presence of routed exams. This is done by setting the CacheLocationID in the MAGJ.INI file for each VistARad workstation.

Setting the CacheLocationID affects VistARad in the following ways:

- When a user logs into VistARad, the locally-defined CacheLocationID is compared to the SITE CODE (IMAGING SITE PARAMETERS file (#2006.1)) of the site being logged into. If the two values are different, the VistARad software assumes that it will be used to display routed images.
- When a routed exam is selected for display, VistARad will check the local storage location for routed images. The storage location checked is specified in the applicable NETWORK LOCATION file (#2005.2) entry at the sending site.

The following steps must be performed for each VistARad workstation that will be used to display routed images.

To set the CacheLocationID in MAGJ.INI

1. Log into the VistARad workstation as an administrator.
2. Use Explorer or the Start | Run menu option to open C:\WINNT\MAGJ.INI.
3. Locate the CacheLocationID line under [Workstation Settings], near the beginning of the file.

4 For `CacheLocationID`, enter the destination name that contains local copies of routed images.

- The value you enter must match a routing destination name as defined in the NETWORK LOCATION file.
- Partial matching can be used to allow VistARad to access images from multiple destinations. For more information, see the next section.

```
…
[Workstation Settings]
WorkStation TimeOut minutes=0
ID=UNKnown
Location=UNKnown
VistaRad test mode=FALSE
CacheLocationID=DEMO
…
```

5 Save and close the file.

Making Multiple Destinations Accessible to VistARad

A VistARad workstation can be used to display images from multiple (local) destinations. This is possible because partial matching is used when the `CacheLocationID` is compared to the names of routing destinations defined in the NETWORK LOCATION file (#2005.2).

For example, if a site is sending images to the destinations shown below, a VistARad workstation with its `CacheLocationID` set to `Telerad` would be able to access both destinations.

```
TeleradMain
TeleradBackup
```

Note that the partial matching used is based on leading characters. Continuing the above example, a destination named `NewTelerad` would not be treated as a match for workstations using `Telerad` as their `CacheLocationID`.

Changes Affecting Routing System Configuration

The following table lists situations that will require a change in routing configuration, and outlines the changes that will need to be made.

Routing System Change	Related Configuration Change
Alteration of location, permissions, etc., of a destination folder	Update NETWORK LOCATION file (#2005.2) entry for the applicable destination
New destination, or name change of existing destination	• Update NETWORK LOCATION file entry for the applicable destination • Update routing rules • Stop and restart transmission processor (if one processor serves all destinations), or start a new instance of the transmission processor for the new destination • Update VistARad workstation MAGJ.INI at receiving site
New Image Gateway / imaging modality	• Configure Image Gateway • Review and update routing rules if needed
Change of radiology staff at sending or receiving site	• Review and update routing rules if needed • Review NETWORK LOCATION file entry for destination and adjust if needed. • Determine if new staff members need on-demand routing privileges
Addition of new VistARad workstation	Update VistARad workstation MAGJ.INI

This page is intentionally blank.

Using the Routing Gateway

This chapter explains how to use the Routing Gateway. This chapter covers the following topics:

This chapter assumes that the Routing Gateway has been properly installed and configured.

⚠ US Federal regulations and VA internal policy prohibit unencrypted transmission of patient information outside the VA's intranet.

⚠ Routing can have a significant impact on network traffic. It is the responsibility of sites using routing to properly manage network demands related to routing. Before activating the routing software, notify your network administrator that there will be an increase (often a significant one) in network traffic to routing destinations.

Activating Routing

The steps below explain how to start the evaluation processor and the transmission processor on the Routing Gateway.

➲ Before performing the following steps, verify that Image Gateways in the routing system are processing images. If images are not being processed, no new entries will be added to the rule evaluation queue.

Starting the Evaluation Processor

1 Verify that the MSM server is running on the Routing Gateway. If it is not, double-click the MSM Console icon to start the MSM server.

2 Open a telnet window and log into the DICOM Gateway software.

3 Enter 3 to select "Routing Gateway" from the DICOM Gateway Menu [MAGDMENU].

4 Enter 3 to select "Start Evaluation Processor" from the Routing Gateway Menu.

5 Position and size the telnet window for subsequent monitoring. (Note that no new information will be shown in the telnet window until the Evaluation Processor encounters entries in Rule Evaluation Queue.)

Starting the Transmission Processor

1 Open a new telnet window and log into the DICOM Gateway software.

2 Enter `3` to select "Routing Gateway" from the DICOM Gateway Menu [MAGDMENU].

3 Enter `1` to select "Start the Transmission Processor."

4 If the Routing Gateway encounters old queue entries, you be will asked if you want to process, convert, or discard the entries. Usually, old entries should be converted.

```
This system has 'old' queue entries.
Do you want to:
  D[iscard] old queue entries
  C[onvert] old queue entries to new data structure
  P[rocess] queue, leaving 'old' entries untouched
Action to take D/C/P: C//
```

5 A list of destinations will be displayed. To select all possible destinations, enter an asterisk (*). To enter a partial list, follow the instructions at the prompt.

```
Possible destinations are:
    125: KANSAS at \\TELERAD3\wichita
    152: ST LOUIS CR at \\vhastlvistarad
    164: PETE KUZMAK at C:\REMOTE\PMK\
    166: LEAVENWORTH, KS at C:\REMOTE\LVW\
    167: DR. JIM FLETCHER'S HOME at C:\REMOTE\JIM\
    168: ST. LOUIS, MO at C:\REMOTE\STL\

Select destinations by:
 ==> Enter their number(s), separated by commas
 ==> Enter an asterisk (*) to select all possible destinations
Prefixing an entry with a dash deselects the listed
destinations

Enter a period when the selection is complete.
---> *
```

6 The destinations you selected will be displayed. Enter a period when you are finished.

7 Position and size the telnet window for subsequent monitoring.

8 To start additional transmission processors, repeat steps 1 – 6 in a new telnet window.

Maintaining Routing

This section provides a summary of maintenance tasks for a routing system and explains how to access Routing Gateway log files.

Periodic Maintenance

The following tasks should be performed periodically to control the size of the transmission queue and to detect potential routing problems.

Task	Interval	Menu Seq.
Check telnet windows for evaluation and transmission processors	2-3 times daily	N/A
Review log files for error messages	Daily	4, 1, 2
Re-queue all failed entries in the transmission queue	As needed based on routing volume	3, 8
Purge completed and expired entries in the transmission queue	Monthly	3, 7
Remove obsolete entries from transmission queue	Monthly	3, 9
Monitor available free space in routing destinations (this can be done using the Background Processor's Network Location Manager)	As Needed	N/A
Confirm access to routing destinations	As Needed	N/A

Using Routing Log Files

A log file is created for each evaluation and transmission processor session. These log files can be used to review routing processes and to ensure that no errors have occurred.

➲ A DICOM Gateway retains the 20 most recently generated log files. Additional files will be retained if they are still open. Older log files are deleted.

Displaying log files

1. Open a telnet window and log into the Routing Gateway.
2. Enter `4` at the prompt to select "System Maintenance" from the DICOM Gateway Menu [MAGDMENU].
3. Enter `1` to select "System Operation."
4. Enter `2` to select "Display DICOM Message Log." The most recent log files will be displayed.
5. Enter the number of the log file you wish to display.

Disabling Routing

Short-Term Routing Shutdown

If routing needs to be disabled for a short period of time, the easiest thing to do is to stop the transmission processor(s). When this is done, images will still be evaluated and queued, but they will not be transmitted until the transmission processor is restarted.

Before restarting the transmission processor, use option 9: Remove Obsolete Entries from Transmission Queue to remove any entries that may have been created while the routing system was disabled. For more information, see page 47.

Long-Term Routing Shutdown

If routing needs to be disabled for an extended period of time, perform the following:

- Stop the evaluation processor
- Stop all transmission processors
- Alter the configuration files for all Image Gateways to indicate that they are NOT part of a routing system (see page 32 for more information).

All images processed when routing is disabled as described above cannot be autorouted, even after routing has been restarted. Such images will need to be routed on-demand using VistARad.

Routing Gateway Menu Options

This section describes the menu options associated with the Routing Gateway. Routing Gateway menu options are accessed by entering 3: Routing Gateway from the DICOM Gateway main menu.

```
1  Start the Transmission Processor
2  Stop the Transmission Processor
3  Start the Evaluation Processor
4  Stop the Evaluation Processor
5  Import Routing Rules
6  Purge all completed entries in the Transmission Queue
7  Purge completed and expired entries in Transmission Queue
8  Re-Queue all Failed Entries in the Transmission Queue
9  Remove Obsolete Entries from Transmission Queue
```

1 Start the Transmission Processor

Use this option to start the transmission processor. Once started, the transmission processor will begin processing entries in the transmission queue.

If a single transmission processor cannot manage a site's routing workload, additional transmission processors, each sending images to a subset of destinations, can be started using this option. For detailed steps, see page 41.

2 Stop the Transmission Processor

Use this option to stop all running instances of the transmission processor. When this option is executed, a flag will be set to a state that the transmission processor will recognize as "stop processing." The transmission processor checks this flag after transmitting each image file.

➲ Stopping the transmission processor can result in an incomplete exam being sent to a destination. If this occurs, the remainder of the exam will be transmitted when the transmission processor is re-started, provided that the applicable entries in the transmission queue are still present.

3 Start the Evaluation Processor

When this option is executed, the evaluation processor will begin examining routing-specific entries in the rule evaluation queue. This file is populated by Image Gateways (provided that Image Gateways are configured as part of a routing system).

The evaluation processor uses the rule evaluation queue and site-specific routing rules to determine which images are to be routed and where they are to be routed. Entries for images to be autorouted are added to the transmission queue.

Typically, a single instance of the evaluation processor can manage all images produced at the sending site. For consolidated sites, an instance of the evaluation processor should

be started for each location. (In this situation, a "location" equates to an entry in the IMAGING SITE PARAMETERS file (#2006.1).)

4 Stop the Evaluation Processor

Use this option to stop the evaluation processor. When this option is executed, a flag will be set to a state that the evaluation processor will recognize as "stop evaluating." The evaluation processor checks this flag after analyzing each image file against the routing rules.

5 Import Routing Rules

When this option is executed, the rules in `\DICOM\Dict\Route.DIC` will be loaded into the Routing Gateway's local MUMPS environment. For detailed steps about importing routing rules, see page 34.

6 Purge all completed entries in the Transmission Queue

Use this option to reduce the size of the transmission queue in test installations. Executing this option will remove entries for files that have been transmitted successfully.

➲ This option is intended for use at test sites. If this option is used, routed images will be "orphaned" at a destination—rather than being deleted automatically (after the defined retention period), the images will remain until deleted manually.

To purge completed entries without orphaning routed images, use the option described in the next section.

7 Purge completed and expired entries in the Transmission Queue

Use this option to control the size of the transmission queue. Executing this option will remove entries if both of the following conditions are met:

- The status of the entry indicates that an image file has been transmitted successfully.
- The entry is older than the `RETENTION PERIOD` (number of days) for the applicable destination.

This option should be run once a month as part of a Routing Gateway's periodic maintenance cycle.

8 Re-Queue all failed entries in the Transmission Queue

Use this option to try to re-send routed images that could not be sent within the number of attempts specified for that destination.

This option should be periodically as part of a Routing Gateway's maintenance cycle. Sites that route a large number of exams, or that route high priority exams, should run this option daily. Sites that route a lower volume of exams may only need to run this option once a week.

9 Remove obsolete entries from Transmission Queue

Use this option when there is a large backlog of outdated entries in the transmission queue. When this option is executed, you will be prompted to enter a cut-off date (the date can be entered using FileMan conventions). After the date is entered, all unprocessed queue entries older than the specified date will be removed.

This option should be run once a month as part of a Routing Gateway's periodic maintenance cycle.

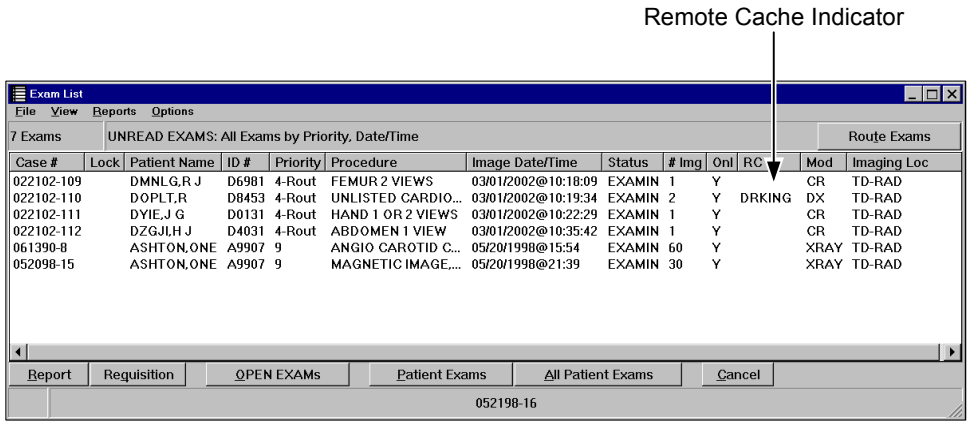
This page is intentionally blank.

Using VistARad in a Routing System

This chapter explains how to use the VistARad diagnostic workstation software at sites that are part of a routing system. This chapter covers the following topics:

Displaying Routed Exams

In V*ISTA* Imaging, the VistARad diagnostic workstation is used to display routed exams. A routed exam is available for display when the RC (Remote Cache) column in a VistARad exam list contains the destination name established for your site.



Values in the RC column are based on the SITE field in the sending site's NETWORK LOCATION file (#2005.2).

- When VistARad is used at a site that is the *source* of routed exams, the RC column can be used to determine which exams have been routed, and where they have been routed to.

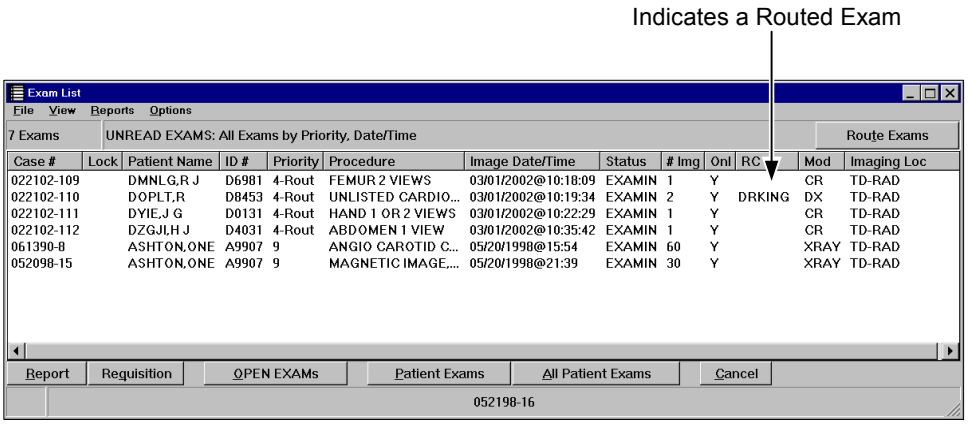
- When VistARad is used at a site that is the *destination* of routed exams, users will need to log into the sending site's **V*ISTA*** System. After logging in, routed exams will be available in any exam list, and are indicated by the presence of the destination site's name in the RC column.

Detailed steps for displaying routed exams are on the next page.

To display a routed exam

1 Log into the site or division that the routed exam was sent from.

2 Use an exam list to locate the routed exam you want to open. The name of your site will be listed in the RC column for that exam.



➲ Depending settings at the site you are logged into, the UnRead, Recent, and All Active lists may display only routed exams, or they may display all available exams.

3 Double-click the exam, or select the exam and click OPEN EXAMs.

- If a non-routed exam (an exam without a value in the RC column) is selected for display, there will be a delay while the images are retrieved.
- A routed exam can be locked and marked as interpreted in the same manner as any other exam. For more information, refer to VistARad User Guide.
- Local copies of routed exams are stored for a certain period of time (typically several days) and then deleted automatically by a process initiated from the sending site. The “original” exam remains available at the sending site after routed copies are deleted.

VistARad & On-Demand Routing

This section describes on-demand routing prerequisites and explains how to use VistARad's on-demand routing capability.

⚠ US Federal regulations and VA internal policy prohibit unencrypted transmission of patient information outside the VA's intranet.

⚠ Like autorouting, on-demand routing can have a significant impact on network traffic. It is the responsibility of sites using routing to properly manage network demands related to routing.

On-Demand Routing Requirements

For on-demand routing to function:

- A VistARad user must be logged into an Imaging System that includes a Routing Gateway.
- At the site being logged into, the **V*IST*A** Imaging host, the Routing Gateway, routing rules, and destination folders must be set up as described in this manual. The Routing Gateway's transmission processor must be running.
- A VistARad user must have the MAGJ DEMAND ROUTE security key assigned to their account. Typically, this key is assigned to radiology supervisors and/or managers.

Using On-Demand Routing

On-demand routing lets you use VistARad to manually select exams and transmit them to existing routing destinations. On-demand routing is intended for situations where you need to route exams that do not satisfy existing routing rules.

➲ If you are frequently using on-demand routing for the same sorts of exams, contact your Imaging Coordinator and request that a change or addition be made to the rules used for autorouting.

Any exam that appears in a VistARad exam list can be routed on-demand. Typically, exams should not be routed until they have been case edited by a technologist using the Radiology package. Such exams have a status of "examined" in VistARad's exam lists.

To use on-demand routing

1 Log into VistARad. The VistARad workstation used for on-demand routing must be logged into a **V*IST*A** System that includes a Routing Gateway.

   ➲ If you have access to more than one division, log into the division where the exams to be routed originate from.

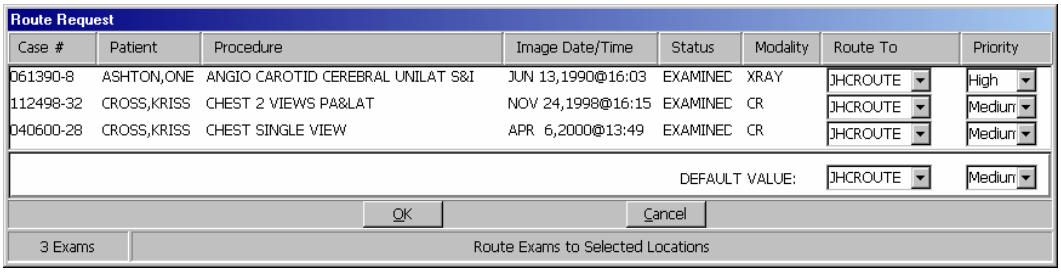
2 Use the exam lists in the VistARad Manager to select the exams you want to send.

3 Click the Route Exams button, located in the upper right corner of the exam list.

➲ If the Route Exams button is not present, your user account does not have the security key for on-demand routing assigned.

4 When the Route Request dialog opens, make sure all the exams you selected are shown.

➲ If a selected exam is not "online" (not available in short-term storage), a message will appear at the bottom of the Route Request window indicating that exam has been requested from the jukebox (long-term storage). Once the exam is available in short-term storage, you can select it for on-demand routing.



5 For each exam, use the 'Route To' box to select where you want to send the exam.

➲ Use the Default Value box near the bottom of the Route Request window to choose a single destination for all listed exams.

6 For each exam, use the Priority box to select the priority used to send the exam.

➲ Use the Default Value box at the bottom of the Priority column to choose a single priority for all listed exams.

➲ The priority assigned to exams for on-demand routing is not related to the exam priority indicated in VistARad's exam lists.

7 Confirm that the settings in the Route Request dialog are correct.

- You can choose not to route a listed exam by selecting the Route To box for that exam and choosing the [Do Not Route] option.
- You can click Cancel to close the Routing Request dialog without routing any exams.

8 Click OK to route the exams. When the exam is received by the receiving site, the RC column entry for that exam will show the name of the receiving site.

Troubleshooting Routing

This chapter covers the following topics:

Basic Troubleshooting

If images are not arriving as expected at a routing destination, perform the following steps:

If…	Then…
This is the first time that routing software is being used	Verify that all configuration steps described in this document have been completed. Configuration checklists are available in Appendix A.
Exams are not being routed or are being routed incorrectly	1 Check the Image Gateways and verify that they are processing images. 2 Attempt to re-send images by running the "Re-Queue all failed entries in the Transmission Queue" option (Routing Gateway menu shortcut: 3, 8). 3 Review the routing log files to determine if the images were transmitted successfully (if you have just used the re-queue failed entries option, wait 15-20 minutes before opening the log files). 4 Review the contents of the routing rules file (Route.dic).
The routing software cannot connect to the destination folder.	Verify that the network connection being used is available and set up properly. Steps for testing destination folders are described on page 25.
The log files indicate an invalid username or password.	Contact the receiving site and verify that the correct user name and password is being used by the routing software.

Getting Help

If additional assistance is needed, contact your Imaging Coordinator or local support staff.

If the problem cannot be resolved locally, open a help desk ticket, or contact the National Help Desk between 8:00AM and 6:00PM Eastern time, Monday through Friday, at 1-888-596-4357.

Urgent after-hours service requests can be directed to the Expertise Center at 1-800-299-7282.

Additional Routing Considerations

Factors Affecting Routing Speed

Given a T1 connection and a light to moderate amount of network traffic, the first images in a routed exam will typically begin arriving at a destination within minutes. However, any of the following can impact the delivery of routed exams:

- A backlog of images at the Image Gateway, which is responsible for adding entries to the rule evaluation queue.
- A backlog of entries in the transmission queue. If numerous large exams are flagged for routing in a brief period of time, there will be a delay while all the images in the exam are transmitted. In situations where multiple destinations are being used, additional transmission processors may be used to alleviate delays. For more information, see page 41.
- Problems connecting to destinations. The routing software will attempt to re-connect or retransmit the number of times specified for each destination in the NETWORK LOCATION file (#2005.2). Failed connection or transmission attempts are logged by the Routing Gateway.
- The routing priority of a particular exam. For more information, see page 54.

Routed Images vs. Routed Exams

The Routing Gateway evaluates and transmits data on an image-by-image basis. If the transmission processor is disabled when an exam is partially transmitted, the exam is usually treated as "unrouted" until the transmission processor is re-started, and the transmission of the exam is completed.

In some situations, such as the presence of multiple Image Gateways or the use of on-demand routing, images from one exam will "interrupt" the transmission of images of an exam that is partially routed. This can occur because entries are added to the rule evaluation and transmission queues for each image, rather than for each exam. Usually, this behavior is invisible to the end user.

If a partially routed exam is opened from VistARad, the VistARad software will first attempt to retrieve images from the local storage location identified in the MAGJ.INI file for that workstation. Images not found in local storage will be retrieved from their originating site.

How the RC Column is Populated

The RC (Remote Cache) column in VistARad's exam lists is populated with a destination-specific indicator when a routed exam is received by a destination. The same indicator is removed from the RC column when the routing software deletes the local copy of the exam.

The addition or removal of the indicator is dependent on a specific "representative image" in the routed exam. A "representative image" is the last image processed by an Image Gateway for a given exam. Typically, the representative image is also the last image in an exam's clinical sequence.

Image Gateways process images in the order that they are received from a modality. Some modalities may send images to Image Gateways in an order other than the expected clinical sequence. If this occurs, and if such an exam is routed, the RC column may be populated before transmission of all the exam's images has completed. A user opening such an exam may experience a delay while part of the exam is retrieved from the sending site.

Preventing Transmission of Duplicate Exams

Before copying an image into a destination folder, the transmission processor will check the folder to see if the image in question is already present. If a duplicate of the image is found, the transmission processor removes the redundant entry from the transmission queue, and moves on to the next entry in the queue.

This page is intentionally blank.

Appendix A

This appendix contains worksheets that can be used while setting up a routing system. They can also be used for record-keeping purposes. The following worksheets are provided:

- Destination Definition Worksheet
- Routing Rule Definition Worksheet
- Routing Setup Checklist

This page is intentionally blank.

Destination Definition Worksheet

Use this worksheet to record information about a specific destination. A sample Network Location file definition is provided on the next page.

Destination name (all caps, no punctuation or spaces) _____ [1]

Site served by destination _____

General purpose of this destination _____

Alternate destination (if this destination is not available) _____

Destination folder name _____

Destination computer/share name _____ [2]

Username/password for destination _____ [2]

Associated user group (if any) _____

File types transmitted to destination (circle those that apply) Abstract / Full / Text / Big [3]

Retention period? (in days) _____ [3]

[1] Specified in the .01 field in the NETWORK LOCATION file. Referenced routing rules (Route.DIC), and in the `CacheLocationID` parameter for VistARad workstations at receiving sites.

[2] Specified by receiving sites when creating the destination folder. Referenced sending site's NETWORK LOCATION file.

[3] Specified in sending site's NETWORK LOCATION file.

NETWORK LOCATION File Sample

For detailed information about specific fields, see page 28.

```
 Select NETWORK LOCATION: TESTDEST
   Are you adding 'TESTDEST' as a new NETWORK LOCATION (the 11TH)?
No// Y

 PHYSICAL REFERENCE: \\VHAxxxxxx\images$\
 STORAGE TYPE: MAG   MAGNETIC
 TOTAL SPACE: <blank>
 SPACE USED: <blank>
 FREE SPACE: <blank>
 OPERATIONAL STATUS: 1  On-Line
 HASH SUBDIRECTORY: <set as appropriate for your site>
 ABSTRACT: N   No
 FULL: Y   Yes
 BIG: Y   Yes
 TEXT: Y   Yes
 DICOM: N   No
 COMPRESSION: <blank>
 USER NAME: <Use the "routing username" here>
 PASSWORD: <Use the "routing password" here>
 MAINTAINCONNECTION: <blank>
 MAX # RETRY ON CONNECT: 3
 MAX # RETRY ON TRANSMIT: 5
 SYNTAX: U UNC
 SUBDIRECTORY: <blank>
 Select USER   <blank>
 RETENTION PERIOD: 5
 LAST PURGE DATE:
 SITE: <set as appropritate for your site>
 ROUTER: Y  YES
 TIME OFFLINE: <blank>
 MUSE SITE #:  <blank>
 MUSE VERSION #: <blank>
```

Routing Rule Definition Worksheet

Rule Request *(to be completed by Radiology staff or supervisor)*

Identify the purpose of the rule (circle one):

a Routine workload sharing
b Rapid access for clinic / facility
c After-hours or holiday coverage
d Second opinions / consults
e Transfer of images to a non-local specialist / support for a new modality or imaging type
f Other _____

List each destination that this rule will serve:

a _____ **d** _____

b _____ **e** _____

c _____

Will all exams for this rule be sent to all listed destinations (circle one): Yes No

If the answer to the above is **NO**, specify the % of exams each destination should receive (total must = 100%):

a _____ ____ % **d** _____ ____ %

b _____ ____ % **e** _____ ____ %

c _____ ____ % local (not routed) ____ %

List conditions that will trigger the execution of the rule (fill any all that apply):

a Exam modality of: _____

b Off hours/holiday coverage (specify hours/days)

_____

_____

_____

c Other _____

_____

Rule Impact/Review *(to be completed by Imaging Coordinator)*	
Estimated amount of storage needed at each destination for this rule:	_____
Bandwidth available between sending and receiving sites:	_____
Total number of exams expected to be transmitted per month:	_____
Rule adheres to routing policies established by sending site (circle one):	Yes No
Rule adheres to routing policies established by receiving site (circle one):	Yes No
Rule Implementation *(to be completed by staff responsible for Routing G/W)*	
Rule as entered into the Route.DIC file: (sample rules listed below)	
Route.DIC imported to Routing Gateway (circle one):	Yes No
Rule tested and found to be functional (circle one):	Yes No
	Date _____

Sample Rules

```
# Single destination
send("KANSAS")
  when MODALITY="CR"
       NOW={MON 00:01AM to 11:59PM;
            WED 00:01AM to 11:59PM;
            FRI 00:01AM to 11:59PM}

# Load Balancing
balance("KANSAS"=25%,"TOPEKA"=35%,<local>=40%)
  when MODALITY="CR"
```

Routing Setup Checklist

Destination Setup

Username and password available for each destination? _____

Folders created and shared for each destination? _____

Ability to access and write to each destination folder verified? _____

Network location entry defined for each destination? _____

DICOM Gateway Setup

Image Gateways configured properly? _____

Routing Gateway configured properly? _____

Routing Rule Setup

Rules defined in Route.DIC? _____

Route.DIC imported successfully? _____

VistARad Setup

VistARad site parameters set up at sending site? _____

CacheLocationID set on workstations at receiving sites? _____

Routing Activation

Image Gateways processing images? _____

Routing Gateway evaluation processor activated? _____

Routing Gateway transmission processor(s) activated? _____

Images routed successfully? _____

Images at receiving site purged at end of retention period? _____

This page is intentionally blank.

Glossary

This manual uses the following terms:

autorouting the automatic transmission of selected images to one or more destinations. Autorouting functions are managed using the Routing Gateway.

destination an intended recipient of routed images, as defined in the sending site's NETWORK LOCATION file.

destination folder the physical storage location provided by a site receiving routed images. A destination folder must be referenced in a destination entry in the NETWORK LOCATION file.

evaluation processor the Routing Gateway process responsible for processing entries in the rule evaluation queue.

IMAGE BACKGROUND QUEUE file (#2006.03) the FileMan file where rule evaluation queue entries are stored. The IMAGE BACKGROUND QUEUE file contains entries used by various processes to move, copy, or delete images. The IMAGE BACKGROUND QUEUE file is populated by Image Gateways, and is used by both the Background Processor and the routing software's evaluation processor.

locks in VistARad, locks are used to prevent more from one radiologist from interpreting the same exam. If a radiologist opens a locked exam, they will be notified that the exam is locked, and while they can display the exam, they will be unable to update its status.

NETWORK LOCATION FILE (#2005.2) the FileMan file where routing destinations are defined. The network location file contains entries for all physical storage devices in the Imaging System.

on-demand routing the transmission of manually selected exams to one or more destinations. Images are selected using the VistARad diagnostic workstation and are transmitted by the Routing Gateway.

receiving site the site where a destination folder/remote storage location is available for receiving routed images. A receiving site is responsible for making sure a destination folder is available and accessible to the routing system.

remote storage location see destination folder.

routing In the **V*IST*A** system, the process responsible for sending images across a WAN to one or more remote locations. Routing can be performed automatically (autorouting), or on-demand.

Routing Gateway a computer running the DICOM Gateway software that is configured to manage the routing of images in the **V*IST*A** System. A Routing Gateway is typically run on a dedicated computer. Also, the set of menu options in the DICOM Gateway software specific to routing.

routing rules the information used by the Routing Gateway to select images for autorouting. Routing rules are defined in a text file and are imported into a MUMPS table used by the Routing Gateway.

routing system all of the software and hardware components related (but not necessarily limited to) routing. Parts of the routing system include the Routing Gateway, Image Gateways, VistARad workstations, and destination folders.

rule evaluation queue the queue used to determine if newly acquired images will be autorouted or not. This queue is populated by Image Gateways. Entries in this queue are compared to routing rules by the evaluation processor. Entries that meet the criteria in routing rules are added to the transmission queue.

SEND QUEUE (#2006.035) the FileMan file where transmission queue entries are stored.

sending site the site where routed images are produced. The Routing Gateway resides at and is maintained by the sending site.

transmission background processor the original name of the transmission processor in test versions of the routing software. Note that there is no relationship between the transmission background processor and the Background Processor.

transmission processor the Routing Gateway process responsible for processing entries in the transmission queue, and for purging obsolete routed image files from routing destinations.

transmission queue the queue used by the transmission processor to send routable images to their destinations. Each entry in this queue represents a single image file. Entries are added to this queue by the evaluation processor (for autorouting) or by VistARad (for on-demand routing). Processed entries can be purged from this queue using a Routing Gateway menu option.

VistARad in **V*IST*A** Imaging, the software used to display diagnostic-quality radiologic exams. VistARad is the primary tool used to display routed exams and to route exams on-demand.

Index

H

I

L

M

N

O

P

R

S

T

U

V

W